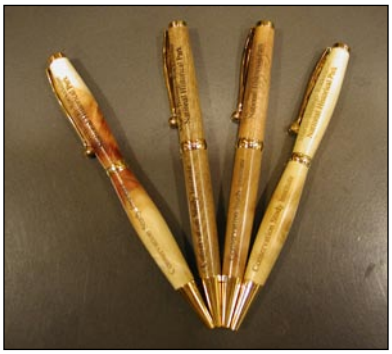
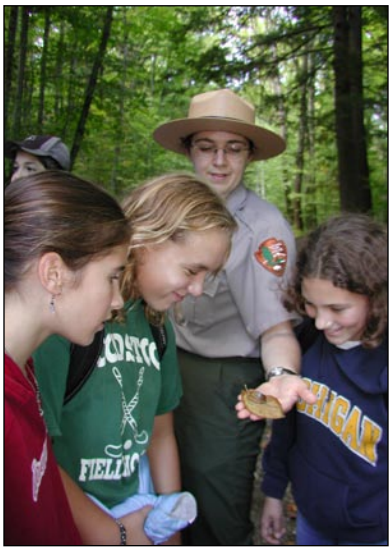
(OCLP 2003)

PART 3: THE FUTURE OF THE MOUNT TOM FOREST





Part 3: The Future of the Mount Tom Forest

This chapter begins with a discussion of the broad vision that is guiding the Park as it carries forward the stewardship legacy of the Mount Tom Forest, and outlines seven specific goals related to historic character, ecological health, sustainable management practices, education and interpretation, visitor use and recreation, watershed and community connections, and adaptive management. The chapter then presents four alternative approaches to management. Key aspects of the alternatives are summarized in a table.

This chapter also outlines management actions that will be pursued regardless of which alternative is ultimately selected. The chapter concludes with a brief discussion of several other management approaches that were considered during the planning process, but ultimately rejected from further analysis.

From top: Equestrians in the Elm Lot (OCLP 2003); pens made from forest products (MABI 2003); park ranger with school group (MABI 2003); marked crop tree (MABI 1999).

3.1 Direction for Future Management: Broad Vision and Management Goals

Inspired by Marsh's call to stewardship in Man and Nature, Frederick Billings believed that a sustainable approach to forest management, embracing aesthetics, conservation, education, recreation, and productivity, would enhance the social and economic well-being of Vermont communities. This vision and forest management ethic was carried forward by Billings' wife and daughters, and Mary and Laurance S. Rockefeller. The uninterrupted practice of conservation has maintained a sustainably managed forest for more than a century, creating a forest that evokes a powerful sense of place and history.

The Park will carry forward this stewardship legacy in the following ways:

- ***Perpetuate the long standing tradition of sustainable forest management.*** Frederick Billings reforested Mount Tom as a model of sustainable, innovative forestry. Throughout the tenure of his daughters and Mary and Laurance S. Rockefeller, the science and practices of forestry continued to evolve. Each generation drew upon the best thinking and practices of its time to continue the sustainable management of Mount Tom. The Park will continue to actively manage the Mount Tom Forest, and draw upon contemporary forest management thinking and practices as it seeks to demonstrate sustainability for public education.

"In reclaiming and reoccupying lands laid waste by human improvidence or malice, [man must] become a co-worker with nature in the reconstruction of the damaged fabric."

George Perkins Marsh, *Man and Nature*, 1864

- ***Take a long-term perspective on the changing composition and character of the Forest.*** The character and composition of the Forest is the result of both human intervention and natural succession that has occurred over the past 135 years. The nature of forest change involves cycles of tree establishment, growth, death, and decay that unfold over decades and centuries. Given the long-term nature of these processes, the Park recognizes that it must work with the dynamics of forest change in timeframes of at least 100 to 200 years in order to effectively retain forest characteristics that illustrate the rich history of Mount Tom.

- ***Value the Forest as both a natural and cultural resource.*** The Forest is both a cultural resource with nationally significant historical associations and features, and a natural resource with complex biological processes and ecological diversity. Older legacy trees, for example, are both an important historical feature of early settlement and valuable ecological habitat. The Park will pursue a management approach of both individual features and broad Forest-wide patterns that integrates cultural and ecological considerations.

"If the complete manufacture of wooden-wares was generally carried on in this state, and our timber consumed that way, it would add greatly to the prosperity of this state, and we think would increase rather than diminish the timber supply as it would demonstrate its value and encourage cultivation."

Report of the Forestry Commission to the Vermont Legislature, October 31, 1884. Frederick Billings, co-author

- ***Emphasize the connection of forest management to broader community well-being and sustainability.*** Throughout the property's history, foresters, woodsmen, gardeners, farmers, and others have worked in the forest of

"The true importance of Marsh, Billings, and those who follow in their footsteps goes beyond simple stewardship. Their work transcends maintenance. It involves new thought and new action to enhance and enrich and even repair the errors of the past. This may be the real importance of what we can be taught and learn at Marsh-Billings. We can not rest on the achievements of the past. Rather, each generation must not only be stewards, but activists, innovators, and enrichers… We look forward to the day when the message and vision of conservation stewardship and its importance for the future will, once again, go out across the nation from the hills of Vermont."

Laurance S. Rockefeller, 1993

Mount Tom—cultivating and harvesting wood and growing agricultural products that were used on the estate and sold in local markets. This tradition was established by Billings in his quest to reinvigorate the economic vitality and well-being of Vermont rural communities. Carrying forward this philosophy, the Park will seek out local markets for forest products and opportunities to create added value through association with place, sustainable management, and craftsmanship (i.e., value-added products).

- ***Strengthen civic engagement and stewardship***. Since Billings opened the carriage roads to the public in the 1880s, the Mount Tom Forest has been a place for the local community and visitors from afar to take in the beauty of Mount Tom while learning about the best current thinking and practices in forest stewardship. This civic mission envisioned by Billings and carried forward by his heirs and Mary and Laurance S. Rockefeller, will be expanded by the Park. The Park will be a "learning laboratory" for all ages, from school groups to adult learners, to explore concepts and techniques in conservation stewardship and sustainable forestry.

Within the context of the vision described above, the Park is committed to the seven management goals listed on the next page.

3.2 Alternatives for Future Management

This section presents different scenarios for implementing the management direction. Alternative A would continue the Park's current short-term approach to forest management. This is a "no action" alternative as required by the National Environmental Policy Act. Alternatives B, C, and D, the "future oriented alternatives," represent much longer-term, proactive approaches to forest management and offer different philosophical approaches for preserving historic character in light of the dynamic nature of forest change and natural succession. Alternative B focuses on preserving existing historic features as they currently exist. Alternative C focuses on continuing the tradition of applying best thinking and practices in forest management. Alternative D integrates approaches common to both B and C. It retains some features and historic characteristics by working with the nature of forest change and applying best thinking and practices in forest management. Alternative D is the NPS-preferred and environmentally preferred alternative.

Management actions that would be the same under Alternatives B, C, and D are described in Section 3.3, Management Actions Common to All Future-Oriented Alternatives.

MANAGEMENT GOALS

Retain Historic Character: The Forest will be managed as a cultural landscape to retain features and characteristics that illustrate the evolution of reforestation and forest management on Mount Tom, interpret the stewardship ethic promoted by the Marsh, Billings, and Rockefeller families, and preserve the essential characteristics of a model nineteenth-century country estate.

Sustain and Enhance Ecological Health: The Park will sustain and seek to enhance the forest's ecological health using best thinking and practices in ecological science and forest management.

Model Sustainable Management Practices: The Park will draw upon contemporary sustainable forestry and agricultural practices in managing the Mount Tom Forest.

Provide Diverse Place-Based Education and Interpretation Opportunities: The Park will provide programs and opportunities for Park visitors, school groups, private woodland owners, conservation professionals, and others to learn about the history of conservation and the principles of contemporary forest management through hands-on, place-based programs.

Promote Visitor Use and Recreation: The Park will continue to manage the Forest for diverse recreational experiences and visitor enjoyment.

Enhance Watershed and Community Connections: The Park will continue to pursue opportunities to work in concert with others to sustain the forest's diverse values and achieve greater watershed and community benefits.

Utilize Adaptive Management to Evaluate and Refine Management Activities: The Park will employ a program of adaptive management to better understand change in the Forest, and to evaluate and refine forest management activities by integrating new science, results from monitoring programs, and best management practices of the day. Ongoing public involvement will encourage a dialogue on the evolving nature of land stewardship and help to inform the Park's forest management.

Most of these goals are compatible with each other. Situations or places where goals overlap or conflict with each other represent opportunities to learn, to further explore innovative approaches to forest management, and to broaden public understanding of the complex nature of contemporary stewardship decisions.

3.2.1 ALTERNATIVE A: CONTINUE CURRENT MANAGEMENT OR "NO ACTION"

This alternative represents a continuation of forest management practices and educational programs that have been implemented since the Park opened to the public in 1998. These include responding to immediate needs such as preservation maintenance, interpretation programs, visitor safety, and continuing with projects having a short-term emphasis (i.e., hazardous tree removal, mowing of vistas and fields, and cleanup of storm-damaged trees).

3.2.1.1 Philosophy

Under the continuation of current management, there would be no long-term philosophy for managing landscape character. The Park would maintain character on a short-term basis, such as preserving visitor experiences along roads and trails by removing dead trees and slash (i.e., treetops and non-merchantable logs) resulting from hazard tree management and mowing fields and pastures.

3.2.1.2 Management Actions

Under this alternative, there would be no long-term focused management activities for plantations, hardwood and mixed forests, or legacy trees. Pastures and hayfields would be mowed or grazed annually, and some vistas would be maintained through periodic mowing. Along the carriage roads and trails, management activities would be limited to removing and slash that result from hazardous tree management; no understory vegetation would be removed to create or retain views into the forest. In the event of catastrophic forest loss due to insects and diseases, fire, or weather events, the Park would salvage merchantable lumber and allow the area to naturally regenerate with native hardwood and conifer trees.

3.2.1.3 The Future Forest

There would be no long-term vision for the future landscape character under this alternative. This existing overall pattern of forested areas and fields would be retained, but historical features such as the plantations and legacy trees would eventually disappear due to gradual decline and decay or potential catastrophic loss. Areas currently in plantations would regenerate to mixed hardwood forest, resembling other second-growth forests in Vermont.

3.2.2 ALTERNATIVE B: ADOPT A "REPLACEMENT IN-KIND" APPROACH TO HISTORIC PRESERVATION

This alternative would focus on preserving landscape features essentially as they existed in 1997, the end of the period of historic significance, which coincides with the end of Laurence S. Rockefeller's tenure on the property.

3.2.2.1 Philosophy

This alternative emphasizes maintaining the current composition and location of existing features to convey the property's historic significance. Management activities would focus on replacing existing features (e.g., plantations, hardwood and mixed forest stands, legacy trees, and views) in-kind and in the same location. The tradition of applying best thinking and practices in forest management and using the Forest as a demonstration of sustainable forest management would be discontinued. Rather, management emphasis would be on maintaining, to the greatest extent possible, a most exact representation of what is essentially seen today.

3.2.2.2 Management Actions

To maintain the overall pattern of plantations, hardwoods, mixed forests, and fields in their current configuration, this strategy would require an intensive forest management program to mitigate the forces of natural succession and ecological change.

Plantations: The existing 150 acres of plantations, ranging in size from 1-acre to 22-acre stands, would be thinned periodically to maintain the health of plantation trees and favor the most vigorous trees. As plantations age and no longer resemble single-species, even-aged plantings (i.e., historic trees make up less than 60 percent of the existing overstory trees), these areas would be cleared of all trees and replanted using the same species and in the same planting pattern. Competing regeneration of native plants would have to be suppressed by using herbicides or mechanical removal during the reestablishment of plantations and after thinning of mature plantations.

Hardwood and Mixed Forest Stands: Hardwood and mixed forest stands would be managed to maintain a resemblance of the current species composition. This would be attempted through silvicultural techniques designed to retain the overall species mix and roughly the same stand structure that currently exist in each stand. In some cases, understory planting might be necessary to achieve the desired composition of tree species.

Legacy Trees: This alternative would maintain the current distribution of legacy trees. Existing legacy trees related to the designed elements of the landscape (i.e., maple trees planted along roads) would be retained as long as possible, in some cases using advanced horticultural techniques (i.e., pruning, cabling, etc.). As these trees deteriorate and become hazardous, they would be replaced using single-tree plantings of the same species and in the same location. If the original species was no longer viable in the Park because of the threat of insect or disease pests, a similar species would be used.

Legacy trees within the plantations and hardwood and mixed forest stands that reflect the historical evolution of the landscape (e.g., large, old hemlock trees)

would be maintained by removing competing vegetation whenever necessary and possible. When needed, replacements for these types of legacy trees would be created by recruiting and growing a few trees within the stand to large-diameter sizes. When planting or recruiting new legacy trees, the Park would also seek to use and promote genetic legacies (i.e., replacement trees either propagated through cuttings or cultivated from the regeneration of the original historic trees).

Hayfields and Pastures: These spaces would be maintained in their current size, location, and species configuration through late-season annual mowings or grazing, nutrient enhancement (e.g., fertilizing), and reseeding, if needed.

Carriage Road Corridors and Vistas: This alternative would carry forward the most exact replication of the carriage road aesthetic characteristics that were present in 1997. All views and vistas would be retained through periodic mowings and forest clearing. To maintain the park-like character along the roads, understory vegetation and downed woody debris visible from the roads would be removed or chipped in those areas where it was typically done during the latter part of the Rockefeller era.

Wildlife Habitat: Under this alternative, wildlife habitat would be maintained over the long term, but not enhanced. Areas in and around vernal pools, riparian areas, and wetlands would retain their current forest and field composition. Coarse woody debris, standing deadwood, and hard and soft mast trees (e.g., oak, beech, black cherry, shadbush) would be retained at their current levels and distributions.

Response to Catastrophic Events: In the event of a catastrophic loss of forest trees due to insects and disease, fire, or weather events, plantations would be replanted with the same species and in the same pattern as the original planting. For hardwood and mixed forest stands, regeneration of the same species mix would be promoted and supplemental plantings would be used if needed. If the loss was due to pests and diseases and the susceptibility of the original species remained high after the catastrophic loss, the Park would replant or manage for the most similar species available as replacements.

3.2.2.3 The Future Forest

Under this alternative, in 100 to 200 years the pattern of fields, plantations, and areas of hardwood and mixed forest would exist essentially as it appears today. As visitors travel the carriage roads and trails, they would see a diversity of forest stands and features that most closely reflects the history of forest management on the property from 1874 to 1997. This would include large areas of single-species plantations at various stages of even-aged growth in distinctive planting patterns, and hardwood and mixed forest stands in their current composition. Visitors to the Park would not have opportunities to see demonstrations of contemporary best thinking and practice in forest management.

3.2.3 ALTERNATIVE C: CONTINUE THE TRADITION OF APPLYING THE BEST CURRENT THINKING AND PRACTICE IN FOREST MANAGEMENT

This alternative emphasizes the use of best current thinking and practices of sustainable forest management in order to carry forward the philosophy of progressive forest management that has informed the stewardship of Mount Tom from Billings' time forward.

3.2.3.1 Philosophy

In this preservation approach historic character would be preserved through continuing the tradition of practicing and demonstrating contemporary progressive forest management established by Frederick Billings and continued by his wife and daughters, and Mary and Laurance S. Rockefeller. Management activities would emphasize use of best current thinking and practices in forest management, creating a landscape character that continually evolves to reflect the forest management practices of each new era. While this approach would continue the philosophy of forest management, it would not perpetuate many individual landscape features that illustrate the historic continuum of forest management practices from the early nineteenth century to late twentieth century.

3.2.3.2 Management Actions

This alternative would maintain a program of applying the best current thinking and practices in forest management. This approach to interpreting the property's history would require that the Park alter its management approach, and the resulting character of the landscape, in response to trends in sustainable forestry and ecological change.

Plantations: This alternative recognizes that plantation management is no longer considered best forest management for areas in the northeastern United States that are able to rapidly regenerate and grow quality native species without planting. Therefore, the existing plantations would be grown to the end of their rotation and slowly transitioned to mixed hardwood and conifer forests of native species that would regenerate naturally on the site. Periodic thinnings of plantations would be carried out to promote the growth of the healthiest, most vigorous plantation trees. With each thinning, hardwood regeneration would be allowed to advance, eventually becoming a dominant component of the overstory and ultimately transitioning the stand to a diverse forest of native species.

Hardwood and Mixed Forest Stands: In hardwood and mixed forest stands, uneven-aged management would be practiced to promote a greater diversity of age classes and vertical structure. Most trees would be harvested when considered mature by conventional silvicultural standards, while some trees would be retained for their ecological value. In some stands or portions of stands where stocking is dense, tree quality is high, and stand age is relatively young, even-aged

management approaches may be used until the stand nears the end of its current rotation.

Legacy Trees: This alternative would maintain existing legacy trees through their natural lives. Intensive horticultural measures would not be used to retain these trees, nor would they be replaced when they die. However, in the plantations and hardwood and mixed forest stands, a few trees would be grown to large-diameter sizes because of their value as wildlife habitat.

Hayfields and Pastures: With changes in the economic realities of agriculture, the small size and remoteness of the fields on Mount Tom make their use for hay production or grazing problematic. However, fields of this type have great potential as wildlife habitat. Therefore, this alternative would maintain the existing open character of these areas, but transition them from non-native perennial grasses to meadows of native herbaceous and woody plant and shrub species that would provide additional wildlife habitat benefits. These meadows would be maintained by late-season mowing every two to three years.

Carriage Road Corridor and Vistas: Contemporary best current thinking and practices in forest management emphasize balancing ecological and silvicultural values, but not to the exclusion of other forest values such as recreation and aesthetics. Therefore, in this alternative vistas would be maintained through mowing or forest clearing. However, managers would have the flexibility to change the location of vistas in response to internal or external needs and constraints (e.g., needing to foster regeneration to replace aging overstory trees, or responding to adjacent development that degrades views). There would be no removal of understory vegetation, downed woody debris, or slash because of their ecological and silvicultural value.

Wildlife Habitat: Under this alternative, wildlife habitat would be considerably enhanced. Levels of coarse woody debris, standing deadwood, slash, and large-diameter trees would be increased throughout the Park, especially within buffer zones of vernal pools, riparian areas, and wetlands. Opportunities to promote trees that provide a high value to wildlife, such as hard and soft mast trees (e.g., oak, beech, black cherry, shadbush), would be explored. Reforestation would be considered along the Pogue Stream to expand the existing forest buffer and enhance amphibian habitat.

Response to Catastrophic Events: In the event of catastrophic forest loss due to insects and disease, fire, or weather events, the affected area would be allowed to naturally regenerate with native species. In the event of loss due to pest and diseases, forest management would favor the retention and growth of those non-susceptible species best suited to the site.

3.2.3.3 The Future Forest

Under this alternative, in 100 to 200 years the forested areas in the Park would become more homogeneous as some of the historic features and aspects of the current patchwork character defined by plantations are lost. However, the overall pattern of forested areas and fields that currently exists would be maintained. As visitors travel the carriage roads and trails, they would see demonstrations of contemporary forestry techniques and experience a landscape with more native hardwood and mixed forest stands punctuated by scattered large, remnant plantation and hardwood trees. However, they would not have the opportunity to explore forest stands that illustrate the evolution of forest management from the late nineteenth century to the end of reforestation in the 1950s.

3.2.4 ALTERNATIVE D (NPS-PREFERRED) ALTERNATIVE: RECOGNIZE AND WORK WITH ECOLOGICAL CHANGE IN PRESERVING THE HISTORIC CHARACTER OF THE FOREST

This alternative would preserve broad landscape patterns and representative features that contribute to the distinctive historic character of the Forest, while working with the forces of ecological change and continuing to apply best current thinking and practices in forest management. The approach would respect the legacy of forest management begun by Frederick Billings and continued by his wife and daughters and Mary and Laurance S. Rockefeller.

3.2.4.1 Philosophy

By emphasizing the overall "sense of place" as defined by broad landscape patterns rather than specific features, the continuum of history from Billings' era to the present would be retained. This approach would preserve the distinctive historic character of the forest as a whole, while recognizing that in some cases individual features or stands may change. Overall, this strategy reflects the forward thinking stewardship approach of Mary and Laurance S. Rockefeller, and the care they took in preserving the historic forest character and understanding and working with ecological change.

3.2.4.2 Management Actions

This alternative would maintain the overall mix of plantations, hardwood and mixed forest stands, and fields on the landscape. However, in adapting to changing ecological site conditions and opportunities some individual features may change in character, location, and extent over time.

Plantations: The approach to plantation management in this alternative would be diverse and would seek to capitalize on specific site conditions. Periodic thinning of existing plantations would be conducted to promote the growth of the healthiest, most vigorous trees. As the plantations age, management would shift to renewing broad, distinctive patterns and characteristics of the property as

a whole.[1] Plantations along principal carriage roads (from the Mansion Grounds and McKenzie Farm areas to The Pogue and South Peak) or that frame key views (e.g., the 1887 Norway spruce and larch plantations framing the French Lot overlook) would be managed to illustrate the character of reforestation techniques used on Mount Tom from 1887 to 1952. Opportunities would be pursued to retain the edges of these plantations through the removal of competing hardwood regeneration, or to seek out new locations along field edges or in small sections of existing plantations where smaller plantings of new softwoods might be established. New plantings would use historic species and planting patterns or suitable alternative native species that would thrive under the specific site conditions. A representation of historic plantation types (i.e., red pine, European larch, Norway spruce, mixed conifer) would be maintained throughout the Park, although it would not be necessary for all new plantations to reestablish historic species. A few key plantations, such as those adjacent to the Mansion Grounds, would be renewed through single tree replacement using direct descendants or genetic legacies.

In plantations outside of the main carriage road corridors and Mansion Grounds, conifer regeneration would be encouraged in areas where existing conditions (i.e., tree health, regeneration, stand conditions) would allow it to thrive. If necessary, competing hardwoods would be thinned to favor conifer regeneration. This approach would create forest stands dominated by large-diameter conifers interspersed with smaller conifers and some hardwoods, resembling the character of some of the oldest plantations currently on the property such as those adjacent to the Mansion Grounds. If stand conditions do not support conifer regeneration, management approaches would follow best current thinking and practices in forest management as described in Alternative C, which would eventually transition these areas to a diverse forest of native species.

Hardwood and Mixed Forest Stands: As in Alternative C, in hardwood and mixed forest stands uneven-aged management practices would be used to promote a greater diversity of age classes and vertical structure. However, as in Alternative C, even-aged management may be used in some stands or portions of stands where stocking is dense, tree quality is high, and stand age is relatively young.

Legacy Trees: The approach to legacy tree management under this Alternative will be similar to Alternative B. However, this alternative would increase the number of legacy trees throughout the property because a greater number of trees within the plantations and hardwood and mixed forest stands would be grown to large-diameter sizes. The approach would encourage the growth of large trees that could convey a sense of the long-term nature of the forest change and provide ecological value.

Hayfields and Pastures: As in Alternative B, the general open character of the fields and pastures would be retained by cultivating perennial grasses through annual mowings or grazing and nutrient management. As stated above, some sections of the field edges adjacent to existing plantations might be used to create new small-scale plantations. These would be positioned as to not preclude existing views.

Carriage Road Corridors and Vistas: As in Alternative C, this alternative would maintain existing vistas through mowing or forest thinning; locations could be changed in response to internal or external needs and constraints (e.g., needing to foster regeneration to replace aging overstory trees, or responding to adjacent development that degrades views). This alternative would also evaluate overgrown historic vistas and consider reopening them where feasible.

Along the main carriage road corridors, some areas of dense understory regeneration would be thinned to create selective views into the forest. Large-diameter downed woody debris would be retained, and slash would be either lopped closed to the ground and distributed throughout the stand so that it is not readily visible from the road, or removed.

Wildlife Habitat: Under this alternative, wildlife habitat would be enhanced. Levels of coarse woody debris, standing deadwood, slash, and large-diameter trees would be increased throughout the Park, especially within buffer zones of vernal pools, riparian areas, and wetlands. Along the main carriage road corridors retention of large-diameter logs would be favored over smaller coarse woody debris, and amounts of slash would be limited. Opportunities to promote trees that provide a high value to wildlife, such as hard and soft mast trees (e.g., oak, beech, black cherry, shadbush), would be explored. Limited reforestation would be considered along the Pogue Stream to expand the existing forest buffer and enhance amphibian habitat.

Response to Catastrophic Events: In the event of a catastrophic loss due to insects, disease, fire, or weather events, this alternative would use different approaches depending on the area of the Forest affected. In the event of forest loss within the Mansion Grounds area, along the main carriage road corridors, or along field edges, managers would consider creating small-scale new plantations in situations where understory hardwood competition is limited. Such new plantations would favor the use of historic species and planting patterns, unless these species would not survive under the site conditions and similar native species can be used as substitutes. If the loss occurs in a plantation away from the main visitor corridor, conifer regeneration would be encouraged in areas where existing site conditions would allow it to thrive. In all other areas, the forest would be allowed to naturally regenerate with species native to the site.

3.2.4.3 The Future Forest

Under this alternative, in 100 to 200 years visitors to Mount Tom would see a diversity of forest stands and a complex pattern of fields, plantations, hardwood and mixed forest stands, and legacy trees comparable to the general pattern that visitors currently experience from the main carriage road corridors. However, individual forest features would not exist as they do today—they may be found in new locations, cover greater or lesser extents of the landscape, and exist in different stages of maturity. Outside of the main corridors, the landscape would become dominated by hardwoods and mixed forest stands in most areas as best current thinking and practices in forest management are used to cultivate a greater diversity of native species. Throughout the Forest, visitors would see demonstrations of contemporary forest management techniques.

3.2.5 COMPARISON OF ALTERNATIVES

A comparison of the alternatives described above is presented in a table format in Table 1 below.

Table 1
Comparison of Alternatives

	Alternative A **Continue current management**	*Alternative B* **Adopt a "replacement-in-kind" approach to historic preservation**	*Alternative C* **Continue the tradition of applying the best current thinking and practice in forest management**	*Alternative D (NPS-preferred)* **Recognize and work with ecological change in preserving the historic character of the forest**
Philosophy				
	No long-term philosophy for management.	Maintain the most exact representation of historic landscape features as they existed in 1997, the end of the period of historical significance.	Interpret and practice the tradition of progressive forestry and allow the landscape character to continually evolve to reflect best current thinking and practices in forest management.	Maintain a sense of the Forest's history through broad landscape patterns and representative historic features while working with ecological processes and continuing to apply best current thinking and practices in forest management.
Management Actions				
Plantations	Passive transition to native species.	Replacement in-kind using same species and planting patterns.	Retain through current rotation, then transition to native species.	Maintain portions of some plantations along the main carriage road corridors; recruit softwood regeneration in others; elsewhere retain plantations through current rotation and then transition to native species.
Hardwood and mixed forest stands	Passive transition to uneven-aged stands.	Conduct even-aged management to attempt to retain existing species composition and structure.	Promote greater age and structural diversity using predominately uneven-age management techniques. Harvest at silvicultural maturity with some large-diameter trees retained for wildlife.	Same as Alternative C.

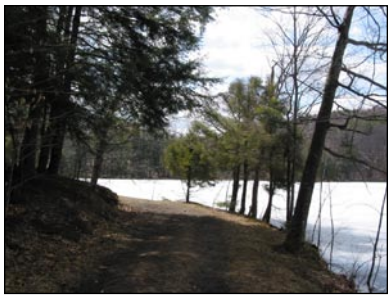
Table 1
Comparison of Alternatives

	Alternative A **Continue current management**	*Alternative B* **Adopt a "replacement-in-kind" approach to historic preservation**	*Alternative C* **Continue the tradition of applying the best current thinking and practice in forest management**	*Alternative D (NPS-preferred)* **Recognize and work with ecological change in preserving the historic character of the forest**
Legacy trees	No preservation measures.	Retain existing legacy trees as long as possible. Replace related to the designed elements of the landscape in-kind. Otherwise, recruit new legacy trees from within the plantations and hardwood and mixed forest stands to maintain existing distribution of legacy trees throughout the property.	Retain existing legacy trees through their current lives, without any intervention. Allow a few large-diameter trees to be retained in forest stands for their wildlife value.	Same as Alternative B, but recruit a greater number of trees within the plantations and hardwood and mixed forest stands to convey a sense of the long-term nature of forest change and provide ecological value.
Hayfields and pastures	Mow or graze annually.	Mow or graze annually, fertilize and reseed if needed to maintain quality of hay production and pasture.	Mow every two to three years and transition to meadows of native herbaceous and woody shrub species.	Same as Alternative B, except small portions of some fields may be used to establish new plantations.
Carriage road corridors and vistas	Maintain some vistas through periodic mowing. Remove slash from along carriage roads.	Maintain existing vistas. Thin understory vegetation and remove downed woody debris from along carriage roads.	Maintain existing vistas, but relocate if needed to achieve other management objectives. No removal of understory vegetation or downed woody debris from along carriage roads.	Maintain existing vistas as in Alternative C and consider reestablishment of historic vistas. Thin understory along some road sections. Retain large-diameter downed wood along corridor, but reduce the height or remove slash.
Wildlife habitat	No long-term wildlife habitat management strategies.	Maintain existing habitat over the long-term, but not enhance.	Transition to higher quality habitat.	Same as Alternative C.
Catastrophic events	Allow areas to naturally regenerate.	Replace lost stands or features using the same species.	Same as Alternative A. However, in the event of loss due to insect and disease, regeneration of non-susceptible species would be encouraged.	Same as Alternatives A and C. However, if loss occurs along main carriage road corridors, then establishment of small-scale plantations would be considered.
The Future Forest (100-200 years)				
	The overall pattern of fields and forest would be retained along with some large legacy trees, but forest areas would become more homogenous as plantations transition to native hardwoods and mixed forests.	The pattern of fields, plantations, and hardwood and mixed forests would exist essentially as it appears today. Visitors would see a diversity of forest stands and features that most closely reflect the history of forest management from 1874 to 1997.	The overall pattern of fields and forest would be maintained. However, the Forest would become more homogeneous as aspects of the current patchwork character defined by plantations are lost. Visitors would experience a landscape with more native hardwood and mixed forest stands punctuated by scattered large, remnant plantation and hardwood trees, and would see demonstrations of best current thinking and practices in forest management.	The general pattern of diverse forest stands and a mix of fields, plantations, hardwood and mixed forest stands, and legacy trees experienced from the main carriage roads would be retained. However, individual forest features may change over time: existing in new locations, cover greater or lesser extents of the landscape, and exist in different stages of maturity. Outside of the main corridors, the landscape would become dominated by hardwoods and mixed forest stands as best current thinking and practices in forest management are used to cultivate a greater diversity of native species.

3.3 Management Actions Common to All Future-Oriented Alternatives (Alternatives B, C, and D)

This section of the Plan identifies a wide range of management actions that would occur under all of the future-oriented alternatives (i.e., Alternatives B, C, and D). These actions are clustered by the seven categories of long-term management goals presented in Section 3.1, although many actions are relevant to more than one category.

3.3.1 CULTURAL RESOURCES AND HISTORIC CHARACTER



From top: The Pogue Loop; dry-laid stone retaining wall along the main carriage road; remnant barbed wire fence line in an old sugar maple. (OCLP 2003, 2004)

Carriage Road and Trail Corridors: Slash from forestry operations along carriage road and trail corridors will be kept below three feet.

Structures: Culverts, causeways, and retaining walls associated with the circulation system, stone walls, and well structures will be preserved.

Small-scale Features: Watering troughs, boundary markers, irrigation lines, and other small-scale features will be preserved.

Archeological Resources: Working with the Vermont State Historic Preservation Office and the University of Vermont Consulting Archeology Program, the Park will identify areas with sensitive archeological resources and implement measures to ensure their protection.

Programmatic Agreement and National Register Listing: The Park will develop a programmatic agreement with the Vermont State Historic Preservation Office that will address Section 106 compliance review for forest management activities, treatment of historic structures, and protection of archeological resources. The Park will also seek to update the National Register of Historic Places documentation on the Park to include information about the significance of the Forest.[2]

3.3.2 ECOLOGICAL HEALTH

Rare, Threatened, and Endangered Species: Federally or state-listed rare, threatened or endangered species and their habitats will be protected by restricting potentially adverse forestry and visitor activities within those habitats. In particular, forestry activities will be excluded from areas west of The Pogue that have identified rare plants.

Natural Communities of Special Management Concern: Forestry treatment activities will be limited in certain natural communities that contribute to the

overall biological diversity of the Park and where site conditions are not suitable for active management. These would include such communities as rich northern hardwood forests, hemlock-red oak forests, dry oak forests, temperate calcareous cliffs, and temperate calcareous outcrops.

Wetlands and Vernal Pools: Forestry activities will be excluded from wetland areas. Best management practices and Park-specific resource studies will be used to designate vernal pool and wetland buffer areas and establish guidelines for habitat management and forestry activities. (See Appendix C for more specific management guidelines.)

Riparian Areas, Seeps, and the Pogue: Treatment guidelines developed from the Vermont Acceptable Management Practices for Maintaining Water Quality on Logging Jobs and findings from Park-specific resource studies will be used to establish buffers and guide forestry activities along all streams, seeps, and The Pogue. (See Appendix C for more specific management guidelines.)

Grassland Breeding Birds and Open Land Management: At a minimum, the Park will delay mowing of fields and vista openings until July 1st to provide time for grassland birds to fledge their first brood.

Downed Coarse Woody Debris and Snags: Levels of downed coarse woody debris and snags representing a diversity of size and decay classes will be maintained or increased. (See Appendix C for more specific management guidelines.)

Invasive Exotic Plants: Working with the NPS Northeast Temperate Inventory and Monitoring Network (NETN), Northeast Region Exotic Plant Management Team (EPMT), and local partners, the Park will implement a program of invasive plant inventory, early detection, treatment, and monitoring. Treatment of invasive plants will be prioritized using a system developed by NETN. Populations of highly invasive exotic plants will be controlled to the extent possible and continually monitored. Special consideration for treatment and monitoring will be given areas where forestry activities will create ground disturbances and changes in canopy cover that could increase invasive plant populations in the area. Treatment activities will include both mechanical and chemical control measures, and will be in accordance with NPS Natural Resource Management Manuel, guidelines for Integrated Pest Management (#77-7).

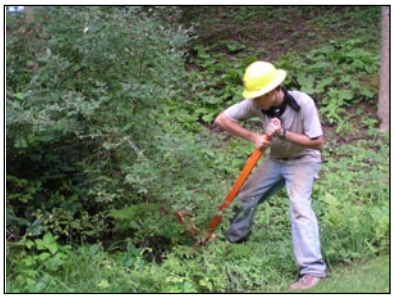
Exotic Species of Historical Significance: Non-native tree species used in historic plantations will not be deliberately eliminated from the landscape because they are historically significant plants, are important for interpretive purposes, and are non-invasive. The distribution and relative abundance of exotic plantation species will be monitored.

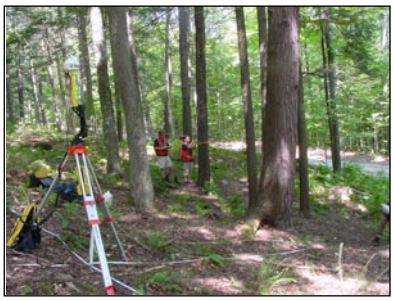
Wetland area east of The Pogue. (Tom Lautzenheiser 2002)

Best Management Practices and Acceptable Management Practices (also known as BMPs and AMPs) are terms that are often used interchangeably in the forestry profession to describe state-designated guidelines developed to minimize soil erosion and other adverse impacts on water quality from forest management activities.

The Pogue. (Tom Lautzenheiser 2002)

Wildland Fire Management: The small size of the Park and proximity to the village of Woodstock and surrounding residential properties precludes allowing wildland fire to burn through the landscape, and the infrequent fire history does not warrant using prescribed fire for ecosystem maintenance. Therefore, wildland fires, regardless of ignition source or location, will be fully suppressed. The Park will work in conjunction with other NPS sites and local fire departments to develop response strategies. In accordance with NPS policy, the Park will use Minimum Impact Suppression Tactics (MIST). Specific strategies for wildland fire management have been developed through a Wildland Fire Management Plan.[3]





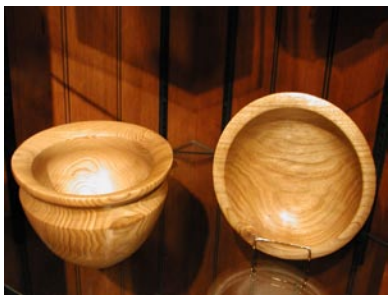
Top, SCA volunteer removing invasives (MABI 2004); bottom, monitoring forest growth and change (MABI 2001).

Pests and Diseases: The Park will monitor and develop threshold action levels for forest pests that pose a risk to forest health through an Integrated Pest Management Plan, currently under development. Treatment actions will follow NPS Natural Resource Management Manuel, guidelines for Integrated Pest Management (#77-7). Annual forest pest surveys will be conducted and in-depth tree health monitoring will be incorporated into ongoing silvicultural assessments.

Genetically Modified Organisms (GMOs): GMOs will not be introduced into the forest.

Herbivory from Deer: The Park will work with the NPS Northeast Temperate Inventory and Monitoring Program and the Vermont Agency of Natural Resources to assess the impact of deer browse on forest regeneration. Management of forest stands in state-identified deer wintering areas will take state guidelines into consideration.

Sensitive Soils: Forestry operations on sensitive soils identified by the Natural Resource Conservation Service (NRCS) will be consistent with the NRCS recommendations for each soil type and slope category, including seasonal limitations on forestry activities where appropriate.[4] In cases where NRCS mapped soils appear to differ from site conditions (e.g., soils appear less limiting than those mapped), management decisions will be made based on actual site assessments.



Hand-turned bowls created from wood harvested from the Mount Tom Forest. (MABI 2004)

3.3.3 SUSTAINABLE MANAGEMENT PRACTICES

Value-added Products: The Park will pursue management activities that promote "value-added" products. These are products that have added economic value because of their association with place, sustainable management, local production, and craftsmanship. Management activities that would support the creation of value-added products would include sustainable timber harvesting, on-site milling and drying of lumber, and supplying local craftspeople and manufacturers with wood. Lumber may also be supplied to other NPS sites, state and local government agencies, and nonprofit organizations for unique historic

preservation and education projects (e.g., restoration of covered bridges and barns requiring large-dimension beams).

Third-Party Forest Certification: The Forest will remain part of the American Tree Farm system, continuing a certification tradition started when it was enrolled as Vermont's first Tree Farm in 1956. The Park's forest management will also be third-party certified through the Forest Stewardship Council (FSC) (see further discussion in Section 4.3). Continuing assessment of the Park's forest management through these two systems will be used as a tool to demonstrate the value of certification in encouraging sustainable management, value-added conservation, and public accountability.

Forestry Techniques and Equipment: A variety of forestry techniques and equipment will be used to achieve overall management objectives for the Park. Treatments will be tailored to the objectives for each stand, stand conditions (e.g., age, species composition, health), and site conditions (e.g., slope, aspect, soil type, access). Treatment activities may include both even-aged management (e.g., planting, intermediate thinning, and partial overstory removal) and uneven-aged management (e.g., single tree and group selection). Additional techniques such as crop tree release and timber stand improvement may also be used. For each of these, a range of strategies and equipment will be considered (e.g., winching, horse logging, conventional skidding, and forwarding). (See Appendix C for further details.)

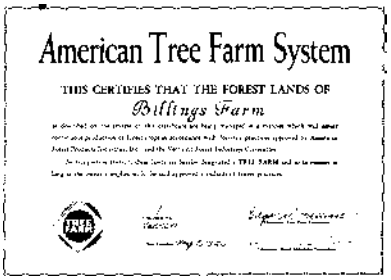
Standards for Harvest Practices: At minimum, harvesting activities will meet or exceed Vermont Acceptable Management Practices (e.g., maintaining and enhancing riparian buffers, preventing non-point-source pollution, minimizing erosion, and reducing sediment and temperature changes in streams). (See Appendix C for more specific guidelines.)

Harvest Volumes: Overall, average annual harvesting will be conducted at a rate at or below average annual net growth (i.e., sustained yield). However, as the existing even-aged stands transition into uneven-aged structure, some annual cuts may need to be greater than average annual net growth to reduce stand density and allow regeneration.

Salvage after Catastrophic Events: In the event of a catastrophic loss of forest due to insects, disease, fire, or weather events, any remaining merchantable wood in the affected area will be harvested. Logs of minimal lumber value will be considered for retention as standing deadwood or coarse woody debris in areas where the amount of this material in the Forest is considered less than desirable based on Park-specific forest monitoring data and in comparisons with other managed forests in the northeast.

Forest certification. Several forest certification systems are in place in North America. Forest Stewardship Council (FSC) certification relies on performance-based monitoring of on-the-ground practices and an assessment of the property's forest management plan. The standards used for FSC certification address environmental, silvicultural, social, and economic issues.

The American Tree Farm System was created in 1941 to promote the growing of renewable forest resources on private lands while protecting environmental benefits and increasing public understanding of all benefits of productive forestry.


American Tree Farm System

THIS CERTIFIES THAT THE FOREST LANDS OF

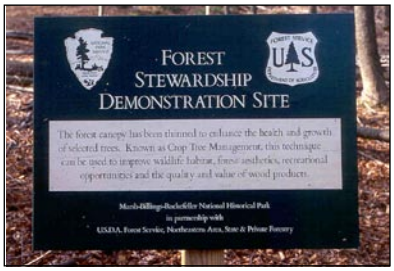
Billings Farm

The Tree Farm certificate awarded to the Billings Farm as Vermont's Tree Farm #1 in the American Tree Farm System, 1956. (Billings Farm & Museum Library and Archives)

Tree Nursery: To continue the genetic legacy of historic plantings, the Park will create a nursery to propagate replacement trees from the historic specimens on the property.

Agricultural Practices: At a minimum, hayfield and pasture management will be conducted in a manner that meets or exceeds compliance with Vermont's Accepted Agricultural Practices (10 V.S.A. 4810). Livestock will continue to be excluded from streams and stream banks, and hayfields will not be cut before July 1 to allow grassland birds to fledge their first broods.

3.3.4 EDUCATION AND INTERPRETATION



From top: Park ranger leading a discussion; forest demonstration sign. (MABI 2000)

The Forest as a Setting for Learning: The Forest will be used to interpret the history of conservation and the principles of contemporary forest management for Park visitors, school groups, private woodland owners, conservation professionals, and others. Educational activities will address the complex social, economic, and ecological issues associated with forest management and use from both local and global perspectives.

Management Transparency: Forest management will be conducted in a way that makes the intent and process of management practices as visible and interpretable to the public as possible. Programs and interpretive displays will be created in association with management activities to provide further explanation of the Park's forest management objectives and approaches. Whenever possible, management operations will be conducted as public activities, providing hands-on learning opportunities at the Park for both the general public and conservation professionals.

Demonstrate Innovative Practices in Forest Management: As outlined above in Section 3.3.3 Sustainable Management Practices, the Park will demonstrate and interpret the role of third-party certification and value-added conservation in promoting sustainable forest management. The Park will consider establishing a solar kiln for drying lumber on site to further demonstrate and interpret the process of creating value-added products.

Interpretive Gateways to the Forest: The 1876 Woodbarn, at the foot of the carriage road near the Park entrance, will be rehabilitated to provide an interpretive exhibit on the Mount Tom Forest and to display the Park's collection of sixteen historic carriages. An adjacent educational/classroom structure will be built as an indoor meeting space for schools and other educational groups visiting the Forest. This project will use wood harvested from the Forest and be a demonstration of sustainable or "green" building techniques.[5] The Park will also develop interpretive displays about current forest management activities to post at pedestrian gateways and the Park's visitor center.

Citizen Science and Participatory Management: The Park will serve as a learning laboratory, encouraging the involvement of the local community, educators, interested professionals, and the broader public as active participants in the management of the Forest. The Park will continue to offer programs such as "Forest for Every Classroom" and "Working Woodlands," as described in Section 4.4. Additional opportunities could include hands-on workshops, creation of citizen-science monitoring programs, and forums with conservation professionals to encourage discussion about new research and best practices in forest management.

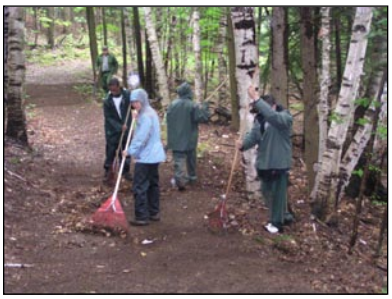
Top, participants in a Forestry for Every Classroom program (MABI 2002); discussion during a Working Woodlands program (MABI 1998).

3.3.5 VISITOR USE AND RECREATION

Permitted and Restricted Uses: Recreational activities such as hiking, horseback riding, bird-watching, nature study, and picnicking will continue to be permitted and encouraged. During winter months, the trails and carriage roads will continue to be operated under easement by the Woodstock Resort Corporation as a component of its wider network of cross-country skiing trails. In accordance with deed restrictions associated with the gift of the property to the people of the United States, mountain biking, hunting, fishing, swimming in The Pogue, camping, campfires, and use of motorized vehicles (except for necessary Park operations) will continue to be prohibited.[6]

Public Access and Forestry Operations: Forest management and forestry practices will be conducted in a manner that maintains or enhances the overall quality and diversity of recreational activities. The Park will continue a hazardous tree management program concentrated on high-visitor-use areas and guided by monitoring and treatment protocols developed in the Hazardous Tree Management Plan.[7] Certain carriage roads and trails will be subject to temporary closures when needed during forestry operations to ensure visitor safety, avoid resource damage, or minimize conflicts with recreational activities. (See Appendix C for more specific guidelines.) A program of visitor notifications will be created to update Park users of when and where forestry activities will occur in order to increase visitor awareness and provide opportunities to select alternative trails.

Maintenance of Carriage Roads and Trails: The Park will continue the program of annual carriage road and trail maintenance. Specifications for rehabilitation and maintenance protocols will be developed through a Carriage Road and Trail Assessment and Maintenance Plan. The Park will work with partner organizations such as the Woodstock Ski Touring Center, Billings Park Commission, Student Conservation Association, Vermont Youth Conservation Corps, Appalachian Trail Conservancy, and the Green Mountain Club to enhance trail management and foster broader connections with area trail networks.



Top, Landmark and SCA trail crew; bottom, trail work by VYCC. (MABI 2004)

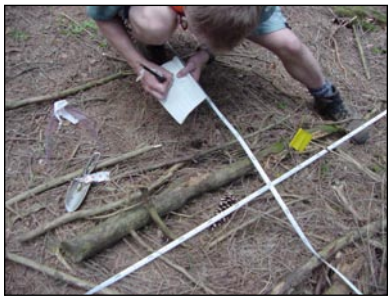
3.3.6 ADAPTIVE MANAGEMENT AND PARTNERSHIPS

Adaptive management—embracing uncertainty. Adaptive management has been defined as "a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs" (Bormann et al. 1996).

Applying Best Current Thinking and Practices of Management: The Park will seek to stay abreast of developments in the fields of forest management, conservation practice, cultural landscape management, etc., including the results of research and new management models and practices. The Park will integrate this knowledge into its management of the Mount Tom Forest as appropriate and feasible. The Park will also cultivate long-term relationships with consulting foresters and forestry professionals to ensure that forest management continues to be informed by professionals with in-depth understanding of Park resources and a commitment to applying best current thinking and practices in forest management.

Civic Engagement: The Park is committed to finding new ways to involve community residents, visitors, and conservation professionals in sustaining the mutual learning process about management of the Forest and similar landscapes. The Park will continue to offer meaningful opportunities for the public to participate in conversations about the management of the Mount Tom Forest and contemporary forest stewardship. For example, the Park may hold annual public forums to discuss relevant research and advances in thinking and practice of sustainable forest management, and offer guided hikes and workshops that examine past and future management activities.

Partnerships: The Park will continue to build a network of partners to enhance research, management, and educational efforts related to forest stewardship. In particular, recognizing that the Forest's ecological, recreational, and historical connections extend beyond the Park boundary, the Park will seek opportunities to work with local landowners and community organizations on collaborative projects such as the development of an integrated community trails system, enhancing ecological connections, and protecting historic resources.



Top, measuring coarse woody debris; bottom, Forest Certification Team at the Park. (MABI 2001)

Research and Monitoring Programs: Working with the NPS Northeast Temperate Inventory and Monitoring Network, other governmental agencies, academic researchers, and other partners, the Park will establish research and monitoring programs related to forest management and ecosystem health. These efforts are likely to include assessment of forest growth and structural changes, regeneration, biological diversity, forest pests and diseases, invasive plant populations, and air and water quality. More specifically, the Park will continue to inventory long-term forest dynamic monitoring plots and develop a five-year forest health and silvicultural assessment program. Monitoring programs will also be explored to analyze change over time for the cultural landscape characteristics. These efforts will help to ensure that ongoing forest management reflects insights gained from on-site monitoring and research. (See further discussion in Section 4.7.)

3.3.7 CONSISTENCY WITH GUIDING LAWS, POLICIES AND PLANS

Forest management will be consistent with the requirements and guidance of federal statutes, policies, and plans that are relevant to the NPS and the Park. In addition to these federal requirements, the Park's management of the Mount Tom Forest will be consistent with the intent of existing applicable local and state regulations (such as Vermont Wetlands Rules and the Vermont Acceptable Management Practices for Maintaining Water Quality on Logging Jobs). (See Section 7.2 for descriptions of Guiding Laws and Policies.)

3.4 ALTERNATIVES CONSIDERED BUT REJECTED

In addition to the four alternatives that are described in Section 3.2, the planning team also considered several other management scenarios that were ultimately rejected from detailed analysis. These scenarios, and the reasons for which they were rejected, are summarized below.

3.4.1 PERIOD RESTORATION

A period restoration approach would attempt to restore the property to represent what the Forest looked like at the time of Frederick Billings' death in 1890, or another specific period of the Park's history. The GMP rejected a period restoration approach because returning the Park's structures and landscape to an earlier historic appearance would be counter to the intent of the enabling legislation, which identifies the continuum of stewardship by George P. Marsh, Frederick and Julia Billings, their heirs, and Mary and Laurance S. Rockefeller. A restoration approach would limit the interpretation of the property's continuous use and would not be practicable due to ecological changes that have occurred over time.[8]

3.4.2 ECOLOGICAL RESTORATION

An ecological restoration approach would involve deliberately removing all non-native species, transitioning all plantations to native communities, and imposing greater limitations on forestry activities. This approach would be contrary to the Park's GMP and would conflict with the Park's legislative mission to protect culturally significant landscape values and history. Like the period restoration alternative, it would prevent the presentation of the historic continuum and the evolution of forestry.

3.4.3 "NO CUT" OR "HANDS OFF" APPROACHES

With a "no cut" or "hands off" approach, there would be no forest management activities, such as thinning, pruning, or harvesting of wood products. Active

forest management is central to the Park's national significance and the historical association of the property to the conservation philosophies and stewardship practices of Marsh, Frederick and Julia Billings, their heirs, and Mary and Laurance S. Rockefeller. There is a clear mandate in the Park legislative history and the GMP to continue the historic legacy of forest management and to use forestry to preserve and interpret the cultural landscape.[9]

Endnotes to Part 3

[1] This work would be initiated before the historic plantations decline because it will require decades if not a generation of work to successfully effect this transition.
[2] The Marsh-Billings-Rockefeller mansion and forty surrounding acres were designated as a National Historical Landmark in 1974, but the remainder of what now constitutes the Park was not. Because of its designation as a National Historical Park, the entire property including the forest is now administratively listed on the National Register, but it has not been documented on a parkwide National Register form as part of a formal nomination and review process.
[3] NPS 2005.
[4] NRCS 2004.
[5] NPS 2005.
[6] NPS 1999.
[7] NPS 2005, draft.
[8] NPS 1999, 32.
[9] NPS 1999, 8-9.